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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,367	09/14/2004	Timothy H. Daubenspeck	BUR920040154US1	5366
30449	7590	10/30/2006	EXAMINER	
SCHMEISER, OLSEN & WATTS			AU, BACH	
22 CENTURY HILL DRIVE				
SUITE 302				
LATHAM, NY 12110			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/711,367

Applicant(s)

DAUBENSPECK ET AL.

Examiner

Bac H. Au

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 18-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 29-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed on July 17, 2006, in which claims 1, 3, 8, and 10 were amended, and claims 29-36 were added, has been entered.

### ***Claim Objections***

2. Claims 29-31 and 33-36 are objected to because of the following informalities:

Regarding claims 29-31 and 33-35, the term "conformal" is unclear whether it applies to the dielectric material itself being a conforming type or that it applies to a specific conformal deposition method resulting in a specific structure, etc. For the purpose of this Office Action, it is interpreted as applying to either.

Regarding claim 36, "polarity" in line 2 should be --plurality--; "said one or more dielectric layers" in line 4 should be --said dielectric layer--.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 8, "bottom surfaces of said wire bond" in section (d) line 2 does not make sense and/or seems to be incomplete. For the purpose of this Office Action, the claim will be treated with this phrase deleted.

The claim is also improperly amended, where the phrase above was added to the claim, but was not appropriately indicated per 37 CFR 1.121 (c) (2). This Rule is being waived in this case; however, appropriate correction is required in the next reply.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3-8, 10-17, and 29-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Bohr (U.S. Pub. 2002/0064929).

Regarding claims 1, 3-8, 10-17, and 29-36, Bohr [Figs.2a-2i] discloses a method, comprising:

- (a) providing a substrate [200];
- (b) forming a passivation layer on a top surface of said substrate [Para.22, lines 4-16];
- (c) forming an electrically conductive layer [202] on a top surface of said substrate; passivation layer;

(d) patterning said conductive layer into a plurality of wire bond pads [composite layers 204,206] spaced apart; top surfaces of said wire bond pads coplanar; said top surface of said substrate exposed between said wire bond pads [Fig.2b];

(e) forming a dielectric layer [212] directly on said top surface of said substrate; said passivation layer; in spaces between adjacent wire bond pads and directly on top surfaces of said wire bond pads; said dielectric layer filling said spaces; and

(f) completely removing said dielectric layer from said top surfaces of said wire bond pads, top surfaces of said dielectric layer in said spaces coplanar with coplanar top surfaces of said wire bond pads [Fig.2d];

recessing [220] said wire bond pads below said top surfaces of said dielectric layer in said spaces after said completely removing said dielectric layer from said top surfaces of said wire bond pads [Fig.2g];

forming a final dielectric layer [218] on said substrate, said dielectric layer and said wire bond pads; and

forming openings [220] in said final dielectric layer to expose less than an entire portion [222] of each said wire bond pad in said openings;

wherein said final dielectric layer [218] comprises a material selected from the group consisting of polyimide and photo-sensitive polyimide [Para.33 lines 4-8];

wherein said dielectric layer [212] comprises a layer of silicon oxide, a layer of silicon nitride or combinations thereof [Para.28 lines 1-7];

wherein said wire bond pads [202; 204,206] comprise aluminum, aluminum copper alloy, copper, gold, tantalum, tantalum nitride or combinations thereof [Para.23 lines 7-12];

further including between steps (b) and (c), forming via openings in said passivation layer exposing regions of electrically conductive wires in said substrate;

wherein step (d) fills said via openings with said electrically conductive layer; and

wherein step (d) includes forming each wire bond pad over at least one said via opening [Para.22, lines 4-16 discloses interconnect structures with multiple levels of interconnect, isolated by insulating layers, and electrically coupled together with metal plugs or vias. These limitations are inherently disclosed.];

wherein said dielectric layer [212] is a conformal layer [Para. 27 lines 4-9; para.28 lines 13-19];

wherein said dielectric layer comprises a first conformal dielectric layer [212] over a second conformal dielectric layer [Para.28 lines 13-19];

wherein top surfaces of both said first and second conformal dielectric layers are coplanar with said top surfaces of said wire bond pads [Fig.2d; para.28 lines 13-19];

wherein said removing said dielectric layer includes: performing a chemical-mechanical polishing [Para.29 lines 5-7];

wherein step (e) includes: depositing said dielectric layer [212] on top of said plurality of wire bond pads, said dielectric layer filling said spaces between said adjacent wire bond pads [Fig.2c]; and

planarizing said dielectric layer in order to coplanarize said top surface of dielectric layer and said top surfaces of said wire bond pads [Fig.2d].

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bohr (U.S. Pub. 2002/0064929) in view of Yu (U.S. Pub. 2004/0121577).

Regarding claims 2, and 9, Bohr discloses electrical interconnects and aspects of integrated circuit manufacturing as discussed above, but fail to explicitly disclose wherein the method further including: recessing said dielectric layer in said spaces

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below said top surfaces of said wire bond pads. However, Yu [Figs.6-7] discloses a method wherein further including: recessing [66,68] said dielectric layer in said spaces below said top surfaces of said wire bond pads [44,48a-b].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Yu into the method of Bohr wherein further including: recessing said dielectric layer in said spaces below said top surfaces of said wire bond pads. The ordinary artisan would have been motivated to modify Bohr in the manner set forth above for at least the purpose of providing low-k air gaps between the metal lines to reduce capacitance [Yu; para.3 lines 19-23].

### ***Response to Arguments***

6. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Applicant's remarks regarding Bohr's bond pad structure is not persuasive as the claims are not so limiting.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



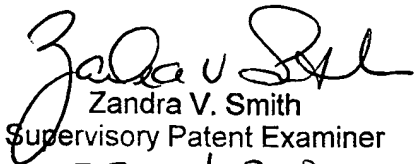
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bac H. Au whose telephone number is 571-272-8795. The examiner can normally be reached on Mon-Fri 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BHA

  
Zandra V. Smith  
Supervisory Patent Examiner  
27 Oct. 2006